Improving Pediatric Sepsis in the Emergency Department Using an Electronic Triage Tool

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Background

- Sepsis is the most common cause of pediatric deaths worldwide
- $4.8 billion economic impact
- Delays in treatment increase morbidity and mortality
- SIRS vital signs have low sensitivity for critical illness
- Physicians have higher specificity for identifying sepsis
- Algorithmic alerts have high sensitivity for identifying sepsis

Problem Statement

This project evaluates whether the implementation of a pediatric sepsis workflow including an electronic triage tool which identifies children at risk for sepsis, a clinician bedside evaluation, and a sepsis order set in a pediatric emergency department (ED) can reduce the time to antibiotics in pediatric patients with sepsis.

Methods

- Uncontrolled before and after study at a US pediatric ED
- Pediatric sepsis workflow went live January 27th, 2020
  - Best Practice Advisory (BPA) fired by Electronic Medical Record (EMR) for abnormal vitals
  - Sepsis assessment performed by bedside clinician
  - New order set based on patient's age
- Data from 1st 60 days compared to same date range from 1 year prior
  - Compared patients who triggered BPA to patients with diagnoses likely to trigger BPA

Results

- 80 of 3,888 pediatric ED encounters triggered the BPA
- 150 of 4036 encounters met inclusion criteria based on diagnosis code
  - A convenience sample was used, and 33 were analyzed directly

Figure 1: Diagram of Pre-BPA encounter inclusion and exclusion

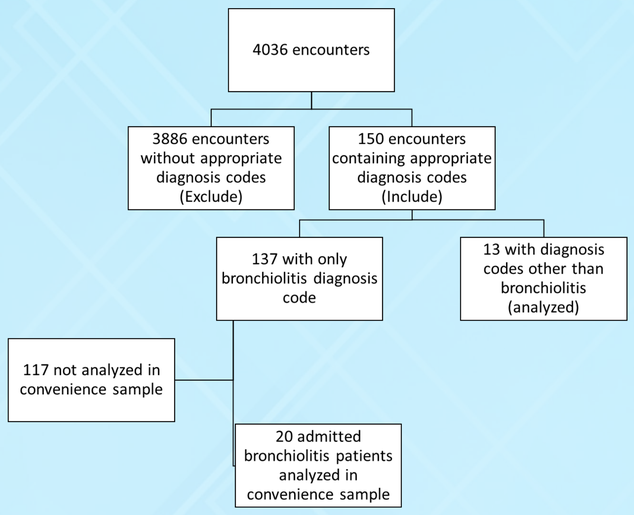

Table 1: Demographics of patients in visits included in pre-BPA and post-BPA analysis.

	Pre-BPA (2019)	Post-BPA (2020)
Total n	33	80
Age		
<60 days	13 (39.3%)	13 (16.2%)
60 days - <1 year	13 (39.3%)	6 (7.5%)
1 year – 4 years	5 (15.1%))	33 (41.2%)
5 years – 11 years	1 (0.30%)	20 (25%)
12 years – 17 years	1 (0.30%)	8 (10%)
Sex		
Male	21 (63.6%)	44 (55%)
Female	12 (36.3%)	36 (45%)

Table 2: Average times for key performance indicators before and after implementation of the BPA

	Pre-BPA (minutes)	Post-BPA (minutes)
Triage to antibiotics	186	99
Triage to IV fluids	118	73
Triage to Huddle	N/A	27
Huddle to antibiotics	N/A	81
Huddle to IV fluids	N/A	58
Huddle to re-huddle	N/A	61
Last huddle to antibiotics	N/A	72
Last huddle to IV fluids	N/A	49

Table 3: Percentages of patients meeting criteria for key performance indicators before and after implementation of the BPA.

	Pre-BPA	Post-BPA
Triage to antibiotics under 60 minutes	0%	41%
Triage to IV fluids under 60 minutes	19%	45%
Triage to huddle under 30 minutes	N/A	78%
Huddle to antibiotics under 60 minutes	N/A	52%
Huddle to IV fluids under 60 minutes	N/A	65%
Huddle to re-huddle under 60 minutes	N/A	50%
Last huddle to antibiotics under 60 minutes	N/A	65%
Last huddle to IV fluids under 60 minutes	N/A	77%

Discussion

- Significant improvements in time from triage to antibiotics were demonstrated (p=0.018)
- Improvements in time from triage to IV fluids were not significant (p=0.307)
- Baseline data regarding time to and from huddle is presented and may be useful for future process evaluation
- Patient ages differ between compared populations
- Use of diagnosis codes approximates BPA triggers, but is not direct comparison of patients who triggered a BPA

Conclusions

- A pediatric sepsis workflow was associated with improvements in time from triage to antibiotics
- Reduced variation and delays in care should lower associated healthcare costs from complications
- Expansion to other EDs may reduce morbidity and mortality from pediatric sepsis

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